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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Yasushi Noguchi

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OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER

ROYSTON, ELIZABETH

ART UNIT

PAPER NUMBER

1747

NOTIFICATION DATE

DELIVERY MODE

08/11/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction27049@oliff.com
jarmstrong@oliff.com

Office Action Summary	Application No. 10/584,943	Applicant(s) NOGUCHI ET AL.	
	Examiner ELIZABETH ROYSTON	Art Unit 1747	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12, 17, 18, 20, 22, 24, 26, 28, 30, and 32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12, 17, 18, 20, 22, 24, 26, 28, 30, and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 12, 17, 20, 22, 24, 26, 28, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (US PG PUB 2003/0143370) in view of Slykhouse (US PN 3773573) and Kitano (US PN 5861214), as evidenced by the MATSUMOTO MICROSPHERE F-series product data.

With regard to claims 12, 17, 20, 28, and 32, Noguchi teaches a method of manufacturing a porous ceramic structure which comprises mixing together a ceramic material (paragraph 43, line 3; paragraph 44, line 3), a foamed resin (paragraph 57, line 4), and a forming auxiliary (paragraph 61, line 1-4), forming the mixture into a body (paragraph 63, line 1-4), and then firing the body (paragraph 65, line 1-6).

Noguchi does not explicitly disclose specific details about the foamed resin.

Kitano teaches a foamed resin with 60 wt% or more of acrylonitrile and 20 wt% or less of methyl methacrylate. Kitano further teaches a diameter of 2 to 200 μm (col. 3, line 53-58; col. 6, Example 4, line 46).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the foamed resin composition in the teaching of Kitano as the foamed resin composition in the teaching of Noguchi. The motivation to do so would have been the rationale provided by the teaching of Kitano, that to use such a resin composition predictably results in a foamed resin with high chemical and heat resistance (col. 1, line 28-29; col. 2, line 41-42) and with an effectiveness that is not lost after four weeks (col. 3, line 64-67).

Although Kitano discloses an example of 15 wt% of a C5 gas (col. 6, Example 4), Kitano is silent as to the acceptable content range of the expandable gas suitable in an expanding sphere made from a methyl methacrylate- acrylonitrile copolymer. However, Slykhouse teaches that gas contents of 10-25wt% gas (col. 3, line 53) were known in the art at the time of the invention as suitable for use in 2-200 μm diameter (col. 3, line 64-66) foamed resin spheres made of a methyl methacrylate - acrylonitrile copolymer comprising about 10-90% acrylonitrile (col. 3, line 26-29), overlapping with the foamed resin sphere compositions in the teaching of Kitano, and with applicant's claimed range.

It would have been obvious to one skilled in the art at the time of the invention to use the foamed resin spheres in the teaching of Kitano with gas contents within the ranges of the teaching of Slykhouse as the foamed resin spheres in the teaching of

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Noguchi. The rationale to do so would be found in the teaching of Slykhouse that using such a gas composition was known in the art as successfully ensuring that the foamed resin predictably improves the distribution of discrete gas bubbles (col. 1, line 56-64) in a mixture, which is in line with the rationale provided by Noguchi of using a foamed resin to create a high-porosity structure (Noguchi, paragraph 57).

Although Noguchi in view of Kitano and Slykhouse does not explicitly the gas loss after 4 weeks when stored at 40 °C, since the composition of the outer shell and the range for the gas content was known in the art at the time of the invention as overlapping the ranges claimed by Applicant, the weight decrease of the gas must also have been within the ranges claimed by Applicant. Additionally, Kitano does teach that the effectiveness of the expanding resin of the invention is stable over four weeks (col. 3, line 64-67), where storage temperatures of up to 40 °C were known for foamed resins, as evidenced by the MATSUMOTO MICROSPHERE F-series product data.

With regard to claims 22 and 24, Noguchi teaches a honeycomb filter with a plurality of through-holes opened in an exhaust gas inflow-side end face and an exhaust gas outflow-side end face and in which the plurality of through holes are closed alternately in opposite end face portions (paragraph 47, line 1-4).

With regard to claim 26, Noguchi teaches a method of manufacturing a ceramic structure wherein the main components include cordierite and silicon carbide (paragraph 43, line 3; paragraph 44, line 3).

2. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (US PG PUB 2003/0143370) in view of Kitano (US PN 5861214) and Slykhouse (US PN 3773573), as evidenced by the MATSUMOTO MICROSPHERE F-series product data, as applied for claims 12, 17, 20, 22, 24, 26, 28, and 32 above, and in further view of Ahmed et al. 1996 and Gehlsen (US PN 6103152).

With regard to claims 18, Noguchi in view of Kitano and Slykhouse does not explicitly disclose 90 wt% or more of acrylonitrile. However, Kitano does teach a resin shell with a combined wt% of acrylonitrile and methacrylonitrile of 90 wt% or more (col. 6, Example 4).

Ahmed teaches that the structural similarity of methacrylonitrile to acrylonitrile allows methacrylonitrile to be used as a replacement for acrylonitrile in plastic and elastomer applications (col. 1, line 1-7). Since methacrylonitrile and acrylonitrile appear to have a known functional equivalency, it would have been obvious to one of ordinary skill in the art at the time of the invention to use 90 wt% or more acrylonitrile in the resin composition in the teaching of Noguchi in view of Kitano.

Furthermore, Gehlsen teaches that the tensile and cohesive strength of the resin is directly dependent on the acrylonitrile content in the resin shell (col. 7-8, line 61-97, 1-25), even to the point of having virtually no secondary polymeric material in high strength shells (col. 8, line 24-25). It would have been obvious to one of ordinary skill in the art the time of the invention to optimize the acrylonitrile content in the teaching of

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Noguchi in view of Kitano according to the teaching of Gehlsen so as to produce a shell with the desired strength.

3. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (US PG PUB 2003/0143370) in view of Kitano (US PN 5861214) and Slykhouse (US PN 3773573), as evidenced by the MATSUMOTO MICROSPHERE F-series product data, as applied for claims 12, 17, 20, 22, 24, 26, 28, and 32 above, and in further view of Nagata (US PN 6440185).

With regard to claim 30, Noguchi in view of Kitano and Slykhouse does not explicitly disclose a shell wall thickness.

Nagata teaches foamed resins comprising methacrylate and acrylonitrile copolymers (col. 5, line 28-29) and an expandable gas content of 10-15 wt% (col. 6, line 43-44) with a shell wall thicknesses of 0.05 to 5 μm (col. 5, line 52-54) were known in the art at the time of the invention.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the shell wall thickness taught by Nagata as the thickness in the teaching of Noguchi in view of Kitano. The rationale to do so would have been found in the teaching of Nagata that using a wall thickness predictably results in the formation of a foamed resin that is readily available and strong (col. 5, line 56-65), where one of ordinary skill in the art would appreciate the readily optimized physical traits where the thicker the shell, the stronger the foamed resin.

Response to Arguments

3. Applicant's arguments filed 5/20/2011 have been fully considered but they are not persuasive.

4. With regard to applicant's argument that Slykhouse fails to disclose a gas, the examiner respectfully disagrees. First, the examiner notes that isobutane is a liquid above -11.7 °C. Second Slykhouse teaches that the expanded spheres have "a thin transparent wall and a gaseous center (col. 2, line 59-63), where the expanded spheres are suitable for use in the mixture (col. 3, line 55-56).

5. With regard to applicant's argument that the interpretation of the Office that Slykhouse discloses spheres containing above 60wt% acrylonitrile is in error, the examiner respectfully disagrees. First, the 10-90 wt% acrylonitrile is a teaching for the possible combination of copolymers suitable for use in the foamed resin (col. 3, line 26-29), and serves as a general teaching that compositions of acrylonitrile above 60% were known in the art at the time of the invention as suitable for use in foamed resins. Second, all foamed resin shells require a blowing agent or else they will not expand according to the invention (col. 2, line 4-11, 59-61). Third, the isobutane is presented as an example of a blowing agent, "the liquid being a volatile fluid foaming agent which is non-solvent for the polymer, such a blowing agent advantageously is isobutane present from about 10 to 25 parts by weight" (col. 3, line 49-52). Nowhere in the teaching of Slykhouse is there an indication that the isobutane can only be used with the specific example of the foamed resin given.

6. With regard to applicant's argument that the use of a foamed resin in Slykhouse does not teach improving the porosity of the material in Noguchi, the examiner respectfully disagrees and believes that the applicant has misunderstood the examiner's reasoning and will therefore attempt to clarify. First, it is the teaching of Noguchi, not Slykhouse that teaches that the presence of a foamed resin increases the porosity of the material by adding pores (Noguchi, paragraph 57). Second, the motivation for using the specific foamed resin in the teaching of Slykhouse is that such a foamed resin predictably results in the formation of "discrete, gaseous bubbles" (col. 1, line 56-57), the goal of foamed resin in the teaching of Noguchi, where such foamed resins have "excellent reproducibility of desired densities", "better sensitivities at higher densities", and "greater reductions in densities with less weight percent of particles" (Slykhouse, col. 1, line 25-33). Essentially, since Noguchi is silent with regard to the specific composition of the foamed resin, it is obvious to use a material designed for a purpose in the purpose it was designed for, i.e. to use a foamed resin designed to produce "discrete, gaseous bubbles" to produce the pores ("discrete, gaseous bubbles") in the teaching by Noguchi (paragraph 57).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELIZABETH ROYSTON whose telephone number is (571)270-7654. The examiner can normally be reached on M-F 9:00am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. R./

Examiner, Art Unit 1747

/Richard Crispino/

Supervisory Patent Examiner, Art Unit 1747